

REMARKS

The Office Action issued April 11, 2002 has been reviewed and the comments of the U.S. Patent and Trademark Office have been considered. Claims 1, 21, 22, 28 and 32 have been amended. Claims 8, 10, 22-31, 34 and 35 are withdrawn from consideration. Claims 1-35, including generic claim 32, are pending in the application and are submitted for reconsideration by the Examiner.

The specification has been objected to under 37 C.F.R. §1.71 as lacking a written description of the movement of the armature in a first and second direction along the longitudinal axis when the electromagnetic coil is energized. Applicant respectfully notes that the originally filed specification provides a written description of the movement of the armature with sufficient particularity so as to enable any person skilled in the art to make and use the invention without extensive experimentation. *See* MPEP § 608.01(g). For example, the originally filed specification states at page 3, line 25, that “[a]n armature is movably disposed in a sleeve 22. When energized, an electric coil 24 causes the armature 20 to move within the sleeve 22” and at page 5, lines 7-10, “[t]he armature 20 with groove 26 includes a plunger or valve member 40. The valve member 40 may close and open an orifice...” *See also* Fig. 10. Therefore, in order for the armature 20 to open and close an orifice of a pressure regulating device, the armature 20 must be able to move in opposite directions in the sleeve 22 in response to an energization of the solenoid. Accordingly, this objection to the specification has been overcome and should be withdrawn.

Claims 1-7, 9, 11-21, 32 and 33 stand rejected under 35 U.S.C. §112, ¶1 as containing subject matter not described in the specification. The Office Action erroneously concludes that the original filed specification failed to convey that the inventor had possession of the claimed invention, including an armature that can move in a first and second direction when an electromagnetic coil is energized.

Applicant respectfully asserts that, at the time of filing of this application, he possessed the claimed invention, which includes, *inter alia*, an armature disposed for movement in a sleeve in a first direction and a second direction when energized by an electromagnetic coil. Applicant submits that the originally filed specification confirms this assertion. The specification states, for example, at page 5, lines 7-10, “[t]he armature 20 with groove 26 includes a plunger or valve member 40. The valve member 40 may close and open an orifice...” *See also* Fig. 10. That is, in

order for the armature 20 to move the valve member 40 so as to open or close an orifice in a sleeve 22, the armature must be able to move in two opposite directions along a longitudinal axis of the sleeve. Therefore, the originally filed specification clearly supports movement of the armature 20 in two different directions and unequivocally conveys that the inventor did possess the claimed invention. Accordingly, this rejection has been overcome and should be withdrawn.

Claims 1-7, 9, 21, 32 and 33 stand rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 5,663,700 to Spence et al., ("Spence"). Applicant respectfully traverses this rejection because Spence fails to teach or suggest the claimed invention as a whole as recited in claims 1, 21 and 32.

Each of the independent claims 1, 21 and 32 has been amended to recite an apparatus with, *inter alia*, a single continuous spring member. The spring member exerts a radially outwardly directed spring force against the sleeve that slows the response of the armature along the axis in a first direction or a second direction opposite to the first direction when the electromagnetic coil is energized. The spring is effective to cause a friction force that slows the response of the movement of the armature (i.e. a damping) in both directions of movement of the armature along the axis when the electromagnetic coil is energized. Support for this amendment to the claims can be found in the originally filed specification at, for example, page 4, line 10 and Figs. 1-12.

In contrast, Spence states, at column 3, lines 17-42, that a smaller groove 92 is disposed within a larger groove 90 on a plunger 80. An O-ring is placed into the smaller groove 92 while a wear band 130 is placed into the larger groove 90 so that the wear band 130—not the O-ring—is in direct contact with tube wall 63 of tube 62. And an air gap 136 separates respective ends of the wear band—instead of a single continuous spring member, as recited in claims 1, 21 and 32.

Accordingly, claims 1, 21 and 32 are patentable over Spence.

Notwithstanding the contradistinctions between Spence and the claimed invention as a whole, one of ordinary skill would not be motivated to modify the wear band of Spence 130 to form a single continuous piece, as such modification could prevent the solenoid from operating. That is, a modification of the wear band to eliminate the air gap would form an airtight seal between the plunger 80 and the tube 62. And as stated at column 4, line 18, the only way for air to escape from the solenoid 10 as the plunger 80 reciprocates in the tube 62 is through the air gap 136. Hence, a single continuous wear band could prevent movement of the plunger 80, thereby rendering the

solenoid 10 of Spence unsuitable for its intended purpose. Accordingly, the rejection to amended claims 1, 21 and 32 should be withdrawn because the claimed invention as a whole recites features not taught or suggested by Spence.

Claims 2-7, 9 and 11-20 depend ultimately from a respective one of allowable claims 1, 21 and 32, are therefore allowable at least for this reason, as well as for reciting additional features.

Applicant respectfully requests rejoinder of withdrawn claims 8, 10, 22-31 and 34-35 because generic claim 32 is now in condition for allowance.

Furthermore, Applicant respectfully requests entry of the amendment as the amendment places the application in condition for allowance or in better form for appeal.

CONCLUSION

In view of the foregoing amendments and remarks, Applicants respectfully request the allowance of pending claims 1-35.

Applicants respectfully invite the Examiner to contact the undersigned by telephone at 202.739-5203 if any outstanding issues remain unresolved.

EXCEPT for issue fees payable under 37 C.F.R. § 1.18, the Commissioner is hereby authorized by this paper to charge any additional fees during the entire pendency of this application including fees due under 37 C.F.R. §§ 1.16 and 1.17 which may be required, including any required extension of time fees, or credit any overpayment to Deposit Account No. 50-0310. This paragraph is intended to be a **CONSTRUCTIVE PETITION FOR EXTENSION OF TIME** in accordance with 37 C.F.R. § 1.136(a)(3). Attached hereto is a marked-up version of the changes made to the claims by the current amendment. The attached pages are captioned: **“Version with Markings to Show Changes Made.”**

Respectfully submitted,

MORGAN, LEWIS & BOCKIUS, LLP

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By: 
Khoi Q. Ta

Reg. No. 47,300

CUSTOMER NO. 009629
MORGAN, LEWIS & BOCKIUS, LLP
1111 Pennsylvania Ave., N.W.
Washington, D.C. 20004
202.739.3000

Version with Markings to Show Changes Made

IN THE CLAIMS:

Claims 1, 21, 22, 28 and 32 have been amended as follows:

1. (Twice Amended) An apparatus, comprising:

an armature having at least one groove formed on an exterior surface thereof;

a sleeve extending along an axis, the armature being disposed for movement in a first direction and a second direction opposite the first direction along the axis in the sleeve;

an electromagnetic coil operative to cause movement of the armature along the longitudinal axis as a response to energization of the electromagnetic coil;

a single continuous spring member disposed in the at least one groove in the armature and in direct sliding contact with the sleeve, wherein the spring member exerts a radially outwardly directed spring force against the sleeve that slows the response of the movement of the armature along the axis in the first and second directions when the electromagnetic coil is energized.

21. (Twice Amended) A method of stabilizing an electromagnetically operated actuator, comprising:

providing a coil and an armature, the armature being disposed for movement in a first direction and a second direction opposite the first direction along the axis in the sleeve, the armature having at least one groove formed on an exterior surface thereof;

moving the armature along the axis as a response to energization of the coil; and

exerting a radially outwardly directed force against the sleeve by a single continuous member disposed in the at least one groove that is in direct contact with the sleeve so as to slows the response of the movement of the armature along the axis in the first and second directions when the electromagnetic coil is energized.

22. (Twice Amended) An apparatus, comprising:

a sleeve extending along an axis and having at least one groove formed on an interior surface thereof;

an armature, the armature being disposed for movement in a first direction and a second direction opposite the first direction along the axis in the sleeve;

an electromagnetic coil operative to cause movement of the armature as a response to energization of the electromagnetic coil; and

a single continuous spring member disposed in the at least one groove in the sleeve and in direct sliding contact with the armature, wherein the spring member exerts a friction force against the armature that slows the response of the movement of the armature along the axis in the first and second directions when the electromagnetic coil is energized.

28. (Twice Amended) An apparatus, comprising:

an armature having at least one radial opening formed therein;
a sleeve extending along an axis, the armature being disposed for movement in a first direction and a second direction opposite the first direction along the axis in the sleeve;
an electromagnetic coil operative to cause movement of the armature along the axis as a response to energization of the electromagnetic coil;

a spring member disposed in the at least one radial opening in the armature; and
a ball bearing member disposed on one end of the spring and in sliding contact with the sleeve, wherein the bearing member exerts a radially outwardly directed force against the sleeve that slows the response of the movement of the armature along the axis in the first and second directions when the electromagnetic coil is energized.

32. (Twice Amended) An apparatus, comprising:

an armature;
a sleeve extending along an axis, the armature being disposed for movement in a first direction and a second direction opposite the first direction along the axis in the sleeve;
an electromagnetic coil operative to cause movement of the armature along the axis as a response to energization of the electromagnetic coil; and

a single continuous spring member in sliding contact with one of the armature and the sleeve, wherein the spring member creates a friction force between the sleeve and the armature that slows the response of the movement of the armature along the axis in the first and second directions when the electromagnetic coil is energized.
